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REMARKS

Claims 33, 35, 36, 44, 46, 54 and 56 have canceled without prejudice to the filing of a divisional application. Claim 29 has been amended to correct informalities. Claims 1, 4, 5, 16, 18-21, 24, 29-31, 58-60, 65-73, 75 and 76 have been rejected.

Claim 1 (only) is in independent form. Claim 1 was rejected under 35 U.S.C. §103(a) over Kondo et al. and Yoshida et al. taken with U.S. Mae et al., Venturoli et al. and Wakabayashi et al. Applicants respectfully request reconsideration of that rejection.

The invention defined in Claim 1 is based on applicants' discovery that some microorganisms heretofore understood to be oxidized coenzyme Q_{10}-producing microorganisms actually contain reduced coenzyme Q_{10} at a high ratio, i.e., a ratio of not less than 70 mole % among the entire coenzyme Q_{10}. Applicants' invention resides in a novel and unobvious process of:

(1) disrupting and/or extracting cultured microbial cells in a condition where reduced coenzyme Q_{10} is protected from an oxidation reaction;

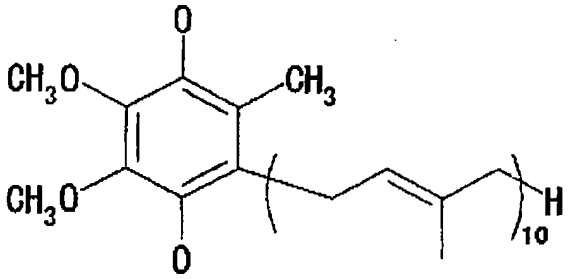
(2) to thereby maintain reduced coenzyme Q_{10} occurring in the microbial cells at high ratio among the entire coenzymes Q_{10}; and

(3) to obtain reduced coenzyme Q_{10} from the microbial cells.

Regarding the prior references relied upon, it is recognized that the same microorganisms as those present in the invention are cultured in the methods of U.S. Kondo et al. and Yoshida et al. However, the present invention is not a microorganism. It is a method for obtaining reduced coenzyme Q_{10} from microorganisms by actively maintaining reduced coenzyme Q_{10} occurring in the microbial cells at high ratio among the entire coenzymes Q_{10}. When a person skilled in the relevant art is not only unaware of the fact that reduced coenzyme Q_{10} is contained in the microbial cells at a high ratio among the entire coenzymes Q_{10}, he or she has (1) no motivation to obtain reduced coenzyme Q_{10} from the microbial cells by maintaining reduced coenzyme Q_{10} at high ratio among the entire coenzymes Q_{10}, and (2) no basis for disruption and/or extraction of the microbial cells under the condition that reduced coenzyme Q_{10} is protected from an oxidation reaction.

Kondo et al. and Yoshida et al. do not disclose the fact that reduced coenzyme Q_{10} is contained in the microbial cells at a high ratio among the entire coenzymes Q_{10}. For example, the term "ubiquinone-10" is consistently used in the reference by Yoshida et al. and the following formula (I) is used for representing structure of coenzyme Q in U.S. Kondo et al.

[formula (I)]



(I)

As such, it can not be contradicted that the term "Ubiquinone-10" and the formula (I) do not mean reduced coenzyme Q_{10}.

Since there exists no recognition in Kondo et al. or in Yoshida et al. that reduced coenzyme Q_{10} is contained in the microbial cells at a high ratio among the entire coenzymes Q_{10}, disruption and/or extraction are not carried out under a condition wherein reduced coenzyme Q_{10} is protected from an oxidation reaction. Moreover, it is concluded on page 20, right column, lines 6 to 9, of Yoshida et al. that the obtained coenzyme Q_{10} is confirmed as "Ubiquinone-10" by HPLC, TLC and ^{13}C NMR. Additionally, it is confirmed in Example 1 of U.S. Kondo et al. that the obtained coenzyme Q_{10} and "authentic coenzyme Q_{10}" are identical. In Kondo et al. "coenzyme Q_{10}" is the same as the formula (I) described that is, "oxidized coenzyme Q_{10}". Accordingly, it is clear that it is oxidized coenzyme Q_{10} that is obtained in these references.

Mae et al. merely discloses that reduced coenzyme Q_{10} is readily transformed to oxidized coenzyme Q_{10} in the electron transfer system. It is not described or suggested in Mae et al. that reduced coenzyme Q_{10} is contained in the microbial cells at a high ratio, that is, at a ratio of not less than 70 mole % among the entire coenzyme Q_{10}.

Venturoli et al. merely observed effects of coenzyme Q (UQ pool) on electron transfer reaction by using Chromatophore isolated from bacteria of the genus Rhodobacter

which are photosynthetic bacteria. Venturoli et al. also examines effects of UQ pool on electron transfer efficiency by simply comparing lyophilized chromatophores and UQ-extracted chromatophores. However, Venturoli et al. does not describe or suggest extraction of coenzyme Q_{10} under the condition that reduced coenzyme Q_{10} is protected from an oxidation reaction. It is only observation of absorbance changes of carotenoid occurring in cell membrane at 503 nm, which observation is carried out by irradiating the above lyophilized chromatophores and UQ-extracted chromatophores with light and reflects results of the electron transfer, that is carried out under nitrogen atmosphere in the reference by Venturoli et al. Moreover, Venturoli et al. does not disclose the ratio of reduced and oxidized coenzyme Q in microbial cells at all. As such, Venturoli et al. can not describe or suggest the method of the present invention.

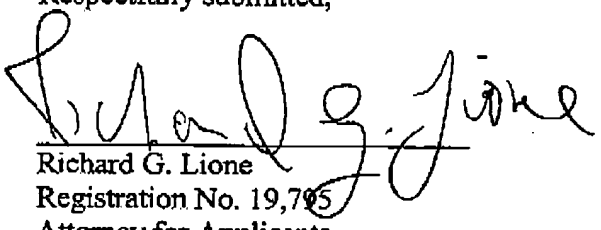
Wakabayashi et al. discloses quantitative analysis of oxidized and reduced coenzyme Q in normal human serum and in rat tissues. The Examiner states that the cited references, Wakabayashi et al. and Venturoli et al., are related to separation and quantification of coenzyme Q and their sources are relevant. Applicants submit this conclusion is incorrect.

Wakabayashi et al. discloses that the ratio of oxidized and reduced coenzyme Q_{10} is different between in a human and in a rat. As mentioned above, the present invention cannot be attained without recognition that reduced coenzyme Q_{10} is contained in the microbial cells at high ratio among the entire coenzymes Q_{10}. However, Wakabayashi et al. does not describe or suggest that recognition at all. Therefore, when taking the difference of the ratio of oxidized and reduced coenzyme Q in living species into consideration, it is not possible to anticipate the ratio thereof in the microorganisms from the ratio thereof in the other living species.

In summary, none of Kondo et al., Yoshida et al., Mae et al., Venturoli et al. or Wakabayashi et al. references describe or suggest that reduced coenzyme Q_{10} is contained in microbial cells at high ratio, that is, at a ratio of not less than 70 mole % among the entire coenzymes Q_{10} at all. As such, a person skilled in the art cannot be motivated by these references to perform the process step or steps of obtaining reduced coenzyme Q_{10} occurring in the microbial cells at high ratio among the entire coenzymes Q_{10}.

Regarding Claims 30 and 31, the applicants identify the culturing conditions that are employed upon determination of the content of the reduced coenzyme Q_{10} (see Claim 29). The conditions are not intended to apply to particular microorganisms. With respect to the penultimate sentence on page 2 of the Action, it is not understandable.

Respectfully submitted,



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